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RABBIT CALICIVIRUS DISEASE ON AILSA CRAIG, AYRSHIRE IN 2003

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Following the eradication of Brown Rats *Rattus norvegicus* from Ailsa Craig in 1991, Rabbit *Oryctolagus cuniculus* numbers were noted to have declined considerably through eating some of the distributed Warfarin bait. However, they survived the baiting operations whereas the rats did not and over the next decade their numbers increased once again to near their former population level of some thousands. Pictures of the changes in vegetation were recorded in the paper on the island's flora (Zonfrillo, 1994). Until the first months of 2003 rabbits were again a major detrimental influence on the island's vegetation.

In spring 2003 the island's vegetation was again looking lush and thriving and noticeable was the lack of the usual "carpets" of rabbit droppings on the pathways. Sightings of rabbits were also lower than could have been expected. Something had clearly reduced the numbers of rabbits at least on the lower sections of the island.

During summer 2003 increases in the flowering plants around the lighthouse "flat" area of the island suggested that locally, rabbits had gone completely. Several wizen rabbit corpses were strewn around this area and no live rabbits were observed. On the upper slopes the situation was similar with many corpses but still a few live rabbits around. No deliberate attempt had been made to eliminate rabbits from the island and thus whatever was affecting the rabbit numbers had been contracted under natural circumstances.

By early July 2003 rabbits were seen in only two areas of the island – under the west cliffs and near the summit on the south side. In the latter site BZ and R S found on 4 July a fresh dead rabbit. The liver and spleen were removed for subsequent examination. HT examined the tissue and noted focal hepatic necrosis in the rabbit with micro thrombi in the hepatic blood vessels. There was also massive necrosis in the spleen. The observed damage was typical of Rabbit Haemorrhagic Disease or as it is more specifically known Rabbit Calicivirus Disease (RCD). This disease is a caliciviral infection and is specific to rabbits only.

Examination of the dead rabbit on the island showed no sign of typical Myxomatosis, a disease that occurs on Ailsa Craig about once a decade (BZ pers. obs.) or any other physical injuries.

By August 2003 no rabbits could be found in any of the previous two areas where noted and it was clear that most if not all had been eliminated.

Rabbits were mentioned as being present on Ailsa Craig as early as 1688, where, as on many islands, they were deliberately introduced to provide food for residents or stranded fishermen in times of bad weather (Lawson, 1888). Detrimental effects of rabbits on the island include soil erosion, vegetation modification and the banishment of some edible plants to the sea cliffs as relict populations e.g. the nationally rare Tree Mallow *Lavatera arborea*.

RABBIT CALICIVIRUS DISEASE.

Caliciviral infections such as RCD are a relatively modern phenomenon in wild rabbit populations. Their origin is believed to be from oceanic sources such as shellfish infected by sewage (Smith et al, 1998). RCD was first reported in China in 1984 and soon after in Europe and then Mexico. By 1991 it had reached Australia. Over a few months, it killed around sixty-four million farmed rabbits in Italy alone. The disease has now affected rabbits in over 40 countries and on four continents. Unlike Myxomatosis that in the 1950s, killed 99 per cent of the rabbit population: the kill rate today is often less than 50 per cent. RCD appears to be 100% lethal, at least on constrained isolated island populations and, in captivity, on rabbit farms.

In Europe, the disease appears to follow a two-year cycle. Young rabbits up to five and sometimes eight weeks old that contract the virus do not die from the disease, but develop antibodies and become immune. They survive to become the breeding population in the following year. Maternal antibodies to the virus can be passed to young and confer immunity. However, this immunity is temporary, lasting some twelve weeks. The next generation of young rabbits become susceptible and rabbit calicivirus can spread through the population once again (Munro et al. 1994).

Comprehensive tests in Australia of RCD showed every indication that rabbit calicivirus is specific only to the European rabbit. Hares *Lepus sp.* are not affected. Other research elsewhere into RCD tested 43 different animal species for susceptibility to rabbit calicivirus. The virus did not grow in any of them (Munro et al, 1994). Rabbits usually die 24 hours after the disease is contracted.

IMPLICATIONS FOR THE SCOTTISH FAUNA

How RCD got to Ailsa Craig, the most southerly of Scottish islands, is a matter for speculation. It was certainly not deliberately introduced but may have arrived through fleas on migrant birds or perhaps even on the boots of human visitors. Rabbits contract the disease through sniffing droppings or contact with infected rabbits or from vectors such as fleas or mosquitoes.

If this disease spreads throughout the rest of the Scottish rabbit population on islands or mainland it may have serious implications if rabbit numbers are greatly reduced or completely eliminated. In some eases these may be beneficial as on Ailsa Craig with improved vegetation and knock-on effects on lepidoptera and other invertebrates and the species that feed on them. Elsewhere, predators in some

areas feeding almost exclusively on rabbit e.g. Golden Eagles *Aquila chrysaetos*, Buzzards *Buteo buteo*, Great Black-backed Gull *Larus marinus* (on Ailsa Craig), Red Fox *Vulpes vulpes* and Stoat *Mustela erminea* to name but a few, may have difficulty surviving.

Ecological impact of RCD on native fauna may result in predation on alternative, supplementary or opportunistic prey. If abundance of prey species changes, then it will be recorded in a predator's diet. 'Prey switching' only occurs if the relative availability of a certain prey species is not reflected in the composition of a predator's diet (Murdoch and Oaten, 1975). Predatory species currently locked in to a mainly rabbit diet will therefore "switch" if rabbit numbers rapidly decline.

Three main responses may arise from a predator that a relies upon a prey species such as rabbit for a main component of its diet throughout the year:

a. Behavioural changes, where habitat use and size of foraging range widens, thus increasing effort.
b. Dietary response, when the loss of main prey is balanced by taking alternative species;
c. Reduction in numbers, when food availability reduces predator populations through starvation that in turn promotes their wider dispersal, increases mortality and results in overall poorer breeding success.

At this early stage the future effects of the calicivirus on rabbit numbers in Scotland should be monitored, as should changes in predator numbers or behaviour patterns. Native fauna and flora may benefit or be at risk from a rapid decline in rabbit numbers. Time will tell if long-term immunity to RCD does not emerge and species recovery therefore becomes unlikely. Consequences for some species of the present Scottish fauna may be profound.

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